CLAIMS

1. A polynucleotide which comprises a sequence encoding an HIV envelope protein or fragment or immunogenic derivative thereof, which is substantially non-glycosylated when expressed in a mammalian target cell, operably linked to a heterologous promoter.

2. The polynucleotide according to claim 1 wherein the HIV envelope protein or fragment or immunogenic derivative thereof is gp120 or a fragment or immunogenic derivative thereof.

3. The polynucleotide according to claim 1 or claim 2 wherein the envelope protein lacks a functional secretion signal.

4. The polynucleotide according to claim 2 or claim 3 wherein the gp120 is expressed as a fusion protein comprising at least one other HIV protein or fragment or immunogenic derivative thereof.

5. The polynucleotide according to claim 4 wherein the at least one other HIV protein or fragment or immunogenic derivative is selected from Nef, Gag, RT or Tat.

6. The polynucleotide according to claim 5 wherein the gp120 encoding sequence is linked to a sequence encoding HIV RT or a fragment or immunogenic derivative thereof and a sequence encoding HIV Gag or a fragment or immunogenic derivative thereof and a sequence encoding HIV Nef or a fragment or immunogenic derivative thereof to encode a gp120, RT, Gag and Nef-containing fusion protein.

7. The polynucleotide according to claim 6 wherein the fusion is selected from gp120-RT-Nef-Gag and RT-Nef-Gag-gp120.

8. The polynucleotide according to claim 5 wherein the gp120 sequence is linked to a sequence encoding HIV Tat or a fragment or immunogenic derivative thereof and a sequence encoding HIV Nef or a fragment or immunogenic derivative thereof to encode a gp120, Nef and Tat-containing fusion protein.

9. The polynucleotide according to claim 8 wherein the fusion is a gp120-Nef-Tat fusion.

10. The polynucleotide according to claim 8 wherein the gp120 is further linked to a sequence encoding HIV Gag or a fragment or immunogenic derivative thereof to encode a gp120, Nef, Tat and Gag-containing fusion protein.

11. The polynucleotide according to claim 10 wherein the fusion is a gp120-Gag-Nef-Tat fusion.

12. The polynucleotide according to any one of claims 5, 6, 7, 10 or 11 wherein the Gag comprises P17 and/or 24.

13. The polynucleotide according to any one of claims 1 to 12 wherein one or more of the sequences encoding gp120, Nef, Gag, RT or Tat or fragment or immunogenic derivative thereof is or are codon optimised to resemble the codon usage in a highly expressed human gene.

14. A polynucleotide sequence selected from the group:

1. gp120 codon optimised, minus secretion signal
2. gp120 codon optimised, minus secretion signal – tr Nef
3. gp120 codon optimised, minus secretion signal – tr Nef – mTat
4. gp120 codon optimised, minus secretion signal – Nef - mTat
5. gp120 codon optimised, minus secretion signal – p17/24 Gag – tr Nef
6. gp120 codon optimised, minus secretion signal – p17/24 Gag – tr Nef - mTat
7. gp120 codon optimised, minus secretion signal - p17/24 Gag - Nef-mTat
8. gp120 codon optimised, minus secretion signal - p17/24 Gag - mNef-mTat

9. gp120 codon optimised, minus secretion signal - p17/24 Gag - L1Nef-mTat
10. gp120 codon optimised, minus secretion signal - p17/24 Gag - L2Nef-mTat
11. gp120 codon optimised, minus secretion signal - p17/24 Gag - LLNef-mTat
12. gp120 codon optimised, minus secretion signal - p17/24 Gag - mLLNef-mTat
13. gp120 codon optimised, minus secretion signal - p17/24 Gag - mL1Nef-mTat
14. gp120 codon optimised, minus secretion signal - p17/24 Gag - mL2Nef-mTat
15. gp120 codon optimised, minus secretion signal - mRT- trNef - p17/24 Gag
16. mRT – trNef – p17/24 Gag – gp120 codon optimised, minus secretion signal

Wherein the RT and Gag are codon optimised.

15. The polynucleotide according to any one of claims 1 to 14 wherein the promoter is the promoter from HCMV IE gene.

16. The polynucleotide according to claim 15 wherein the 5' untranslated region between the promoter and coding polynucleotide comprises exon 1.

17. A set of polynucleotides comprising a polynucleotide according to any of claims 1 to 16 and at least one further polynucleotide encoding at least one of HIV Nef, Gag, RT or Tat or fragment or immunogenic derivative thereof.

18. The set of polynucleotides according to claim 17 wherein the polynucleotides are contained on a single vector under the control of two or more separate promoters.

19. The set of polynucleotides according to claim 17 or 18, encoding a gp120 or fragment or immunogenic derivative and a fusion of RT-Nef-Gag or of fragments or immunogenic derivatives thereof.

20. A set of polynucleotides according to claim 17 or claim 18 selected from the following:

1. gp120 codon optimised, minus secretion signal + tr Nef-mTat
2. gp120 codon optimised, minus secretion signal + P17/24 Gag - tr Nef
3. gp120 codon optimised, minus secretion signal + P17/24 Gag - Nef - mTat
4. mRT – tr Nef – P17/24 Gag + gp120 codon optimised, minus secretion signal

5. gp120 codon optimised, minus secretion signal + mRT – tr Nef – P17/24 Gag wherein RT and Gag are codon optimised.

21. A vector comprising a polynucleotide or polynucleotides as claimed in any one of claims 1 to 20.

22. The vector according to claim 21 which is a double stranded DNA plasmid.

23. The vector according to claim 21 which is a replication defective adenovirus vector.

24. The vector according to claim 23 which is derived from Pan 9, 5, 6 or 7.

25. A fusion protein comprising a substantially non-glycosylated HIV envelope protein or a fragment or immunogenic derivative thereof and at least one additional HIV protein or fragment or immunogenic derivative thereof said additional HIV protein selected from Nef, Gag, RT and Tat.

26. A composition comprising a substantially non-glycosylated HIV envelope protein or a fragment or immunogenic derivative thereof and at least one additional HIV protein or fragment or immunogenic derivative thereof, preferably in the form of a fusion protein, said at least one additional HIV protein selected from Nef, Gag, RT and Tat.

27. A polypeptide encoded by the polynucleotide or vector according to any of claims 1 to 24.

28. A pharmaceutical composition comprising a nucleotide sequence or a set of nucleotide sequences according to any one of claims 1 to 20, a vector of claim 21 to 24, a fusion proten according to claim 25 or a composition according to claim 26 or a polypeptide according to claim 27, and a pharmaceutically acceptable excipient, diluent, carrier or adjuvant.

29. The pharmaceutical composition according to claim 28 wherein the carrier is a plurality of particles such as gold beads.

30. The pharmaceutical composition according to claim 28 or 29 for delivery in a prime boost format.

31. An intradermal delivery device comprising a pharmaceutical composition according to any one of claims 28 to 30.

32. A method of treating a patient suffering from or susceptible to a disease comprising administering a safe and effective amount of a pharmaceutical composition according to any one of claims 28 to 30.

33. A polynucleotide or a vector or fusion protein or composition or polypeptide according to any one of claims 1 to 27 for use in medicine.

34. Use of a polynucleotide or a vector or fusion protein or composition or polypeptide according to any one of claims 1 to 27 in the manufacture of a medicament for the treatment of disease.

35. A process for the production of a polynucleotide according to any one of claim 1 to 20 comprising linking a nucleotide sequence encoding a substantially non-glycosylated HIV envelope molecule or fragment or immunogenic derivative thereof and optionally a sequence encoding an HIV regulatory protein or fragment or immunogenic derivative thereof, to a heterologous promoter sequence.